

PCTEST

7185 Oakland Mills Road, Columbia, MD 21046 USA Tel. 410.290.6652 / Fax 410.290.6654 http://www.pctest.com



MEASUREMENT REPORT FCC PART 15.247 / RSS-247 Bluetooth (Low Energy)

Applicant Name:

Samsung Electronics Co., Ltd. 129, Samsung-ro, Yeongtong-gu, Suwon-si Gyeonggi-do, 16677, Korea

Date of Testing: 10/11/19 - 01/20/20 Test Site/Location: PCTEST Lab. Columbia, MD, USA Test Report Serial No.: 1M1911010179-09.A3L

FCC ID: IC:

A3LSMG986W

649E-SMG986W

Certification

APPLICANT:

Samsung Electronics Co., Ltd.

Application Type: Model/HVIN: EUT Type: Max. RF Output Power: Frequency Range: FCC Classification: FCC Rule Part(s): Test Procedure(s):

SM-G986W Portable Handset 7.345 mW (8.66 dBm) Peak Conducted 2402 – 2480MHz Digital Transmission System (DTS) Part 15 Subpart C (15.247) ANSI C63.10-2013, KDB 558074 D01 v05r02, KDB 648474 D03 v01r04

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10-2013 and KDB 558074 D01 v05r02. Test results reported herein relate only to the item(s) tested.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Randy Ortanez President



FCC ID: A3LSMG986W	<u> <u> <u> </u> <u> </u></u></u>	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 1 of 54
1M1911010179-09.A3L	10/11/19 - 01/20/20	Portable Handset		Page 1 of 54
© 2020 PCTEST	•	•		V 9.0 02/01/2019



TABLE OF CONTENTS

1.0	INT	RODUCTION	3
	1.1	Scope	3
	1.2	PCTEST Test Location	3
	1.3	Test Facility / Accreditations	3
2.0	PRO	DDUCT INFORMATION	4
	2.1	Equipment Description	4
	2.2	Device Capabilities	4
	2.3	Test Configuration	4
	2.4	EMI Suppression Device(s)/Modifications	4
3.0	DES	SCRIPTION OF TESTS	5
	3.1	Evaluation Procedure	5
	3.2	AC Line Conducted Emissions	5
	3.3	Radiated Emissions	6
	3.4	Environmental Conditions	6
4.0	ANT	ENNA REQUIREMENTS	7
5.0	ME	ASUREMENT UNCERTAINTY	8
6.0	TES	T EQUIPMENT CALIBRATION DATA	9
7.0	TES	T RESULTS	. 10
	7.1	Summary	10
	7.2	6dB Bandwidth Measurement – Bluetooth (LE)	11
	7.3	Output Power Measurement – Bluetooth (LE)	19
	7.4	Power Spectral Density – Bluetooth (LE)	27
	7.5	Conducted Emissions at the Band Edge	35
	7.6	Conducted Spurious Emissions	40
	7.7	Radiated Spurious Emission Measurements	45
	7.8	Radiated Restricted Band Edge Measurements	50
	7.9	Line-Conducted Test Data	51
8.0	COI	NCLUSION	. 54

FCC ID: A3LSMG986W	<u> PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 2 of 54
1M1911010179-09.A3L	10/11/19 - 01/20/20	Portable Handset		Page 2 of 54
© 2020 PCTEST				V 9.0 02/01/2019



1.0 INTRODUCTION

1.1 Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Innovation, Science and Economic Development Canada.

1.2 PCTEST Test Location

These measurement tests were conducted at the PCTEST Engineering Laboratory, Inc. facility located at 7185 Oakland Mills Road, Columbia, MD 21046. The measurement facility is compliant with the test site requirements specified in ANSI C63.4-2014.

1.3 Test Facility / Accreditations Measurements were performed at PCTEST Engineering Lab located in Columbia, MD 21046, U.S.A.

- PCTEST is an ISO 17025-2005 accredited test facility under the American Association for Laboratory Accreditation (A2LA) with Certificate number 2041.01 for Specific Absorption Rate (SAR), Hearing Aid Compatibility (HAC) testing, where applicable, and Electromagnetic Compatibility (EMC) testing for FCC and Innovation, Science, and Economic Development Canada rules.
- PCTEST TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC 17065-2012 by A2LA (Certificate number 2041.03) in all scopes of FCC Rules and ISED Standards (RSS).
- PCTEST facility is a registered (2451B) test laboratory with the site description on file with ISED.

FCC ID: A3LSMG986W	<u> <u> <u> </u> <u> PCTEST</u> </u></u>	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 2 of 54
1M1911010179-09.A3L	10/11/19 - 01/20/20	Portable Handset		Page 3 of 54
© 2020 PCTEST				V 9 0 02/01/2019



2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung Portable Handset FCC ID: A3LSMG986W**. The data found in this test report was taken with the EUT operating in Bluetooth low energy mode. While in low energy mode, the Bluetooth transmitter hops pseudo-randomly between 40 channels, three of which are "advertising channels". When the transmitter is hopping only between the three advertising channels, the EUT does not fall under the category of a "hopper" as defined in 15.247(a)(iii) which states that a "frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels." As operation on only the advertising channels does not qualify the EUT as a hopper, the EUT is certified as a DTS device in this mode. The data found in this report is representative of the device when it transmits on its advertising channels. Typical Bluetooth operation is covered under the DSS report found with this application.

Test Device Serial No.: 0306M, 0388M, 0337M, 0930H, 0764H

2.2 Device Capabilities

This device contains the following capabilities:

850 CDMA/EvDO Rev0/A, 1x Advanced (BC0), 850/1900 GSM/GPRS/EDGE, 850/1700/1900 WCDMA/HSPA, Multi-band LTE, 5G NR (n71, n66, n41), 802.11b/g/n/ax WLAN, 802.11a/n/ac/ax UNII, Bluetooth (1x, EDR, LE), NFC, ANT+, Wireless Power Transfer

C	Ch.	Frequency (MHz)
	0	2402
	:	:
	19	2440
	:	:
;	39	2480

Table 2-1. Frequency / Channel Operations

2.3 Test Configuration

The EUT was tested per the guidance of ANSI C63.10-2013 and KDB 558074 D01 v05r02. ANSI C63.10-2013 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing. See Sections 3.2 for AC line conducted emissions test setups, 3.3 for radiated emissions test setups, and 7.2, 7.3, 7.4, 7.5, and 7.6 for antenna port conducted emissions test setups.

This device supports wireless charging capability and, thus, is subject to the test requirements of KDB 648474 D03 v01r04. Additional radiated spurious emission measurements were performed with the EUT lying flat on an authorized wireless charging pad (WCP) Model: EP-N5100 while operating under normal conditions in a simulated call or data transmission configuration. The worst case radiated emissions data is shown in this report.

2.4 EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and/or no modifications were made during testing.

FCC ID: A3LSMG986W	<u> <u> <u> </u> <u> </u></u></u>	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dogo 4 of 54
1M1911010179-09.A3L	10/11/19 - 01/20/20	Portable Handset		Page 4 of 54
© 2020 PCTEST				V 9.0 02/01/2019



DESCRIPTION OF TESTS 3.0

3.1 **Evaluation Procedure**

The measurement procedures described in the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices (ANSI C63.10-2013) and the guidance provided in KDB 558074 D01 v05r02 were used in the measurement of the EUT.

Deviation from measurement procedure.....None

3.2 AC Line Conducted Emissions

The line-conducted facility is located inside a 10'x16'x9' shielded enclosure. The shielded enclosure is manufactured by ETS Lindgren RF Enclosures. The shielding effectiveness of the shielded room is in accordance with MIL-Std-285 or NSA 65-5. A 1m x 1.5m wooden table 80cm high is placed 40cm away from the vertical wall and 80cm away from the sidewall of the shielded room. Two 10kHz-30MHz, $50\Omega/50\mu$ H Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room floor. Power to the LISNs is filtered by external high-current high-insertion loss power line filters. The external power line filter is an ETS Lindgren Model LPRX-4X30 (100dB Attenuation, 14kHz-18GHz) and the two EMI/RFI filters are ETS Lindgren Model LRW-2030-S1 (100dB Minimum Insertion Loss, 14kHz - 10GHz). These filters attenuate ambient signal noise from entering the measurement lines. These filters are also bonded to the shielded enclosure.

The EUT is powered from one LISN and the support equipment is powered from the second LISN. If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and this supply line(s) will be connected to the second LISN. All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion) and draped over the back edge of the test table. All cables were at least 40cm above the horizontal reference groundplane. Power cables for support equipment were routed down to the second LISN while ensuring that that cables were not draped over the second LISN.

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the spectrum analyzer and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The spectrum was scanned from 150kHz to 30MHz with a spectrum analyzer. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 10kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Once the worst case emissions have been identified, the one EUT cable configuration/arrangement and mode of operation that produced these emissions is used for final measurements on the same test site. The analyzer is set to CISPR guasi-peak and average detectors with a 9kHz resolution bandwidth for final measurements.

Line conducted emissions test results are shown in Section 7.9. The EMI Receiver mode of the Agilent MXE was used to perform AC line conducted emissions testing.

FCC ID: A3LSMG986W	<u> <u> <u> </u> <u> PCTEST</u> </u></u>	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dogo E of E4
1M1911010179-09.A3L	10/11/19 - 01/20/20	Portable Handset		Page 5 of 54
© 2020 PCTEST	•			V 9 0 02/01/2019



3.3 Radiated Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. The test site inside the chamber is a 6m x 5.2m elliptical, obstruction-free area in accordance with Figure 5.7 of Clause 5 in ANSI C63.4-2014. Absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections for measurements above 1GHz. An 80cm tall test table made of Styrodur is placed on top of the turn table. For measurements above 1GHz, an additional Styrodur pedestal is placed on top of the test table to bring the total table height to 1.5m.

For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive antenna height using a broadband antenna from 30MHz up to the upper frequency shown in 15.33 depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies above 1GHz, linearly polarized double ridge horn antennas were used. For frequencies below 30MHz, a calibrated loop antenna was used. When exploratory measurements were necessary, they were performed at 1 meter test distance inside the semi-anechoic chamber using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies and modes producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The test set-up was placed on top of the 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, mode of operation, turntable azimuth, and receive antenna height was noted for each frequency found.

Final measurements were made in the semi-anechoic chamber using calibrated, linearly polarized broadband and horn antennas. The test setup was configured to the setup that produced the worst case emissions. The spectrum analyzer was set to investigate all frequencies required for testing to compare the highest radiated disturbances with respect to the specified limits. The turntable containing the EUT was rotated through 360 degrees and the height of the receive antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by changing the orientation of the EUT through three orthogonal planes and changing the polarity of the receive antenna, whichever produced the worst-case emissions.

All radiated measurements are performed in a chamber that meets the site requirements per ANSI C63.4-2014. Additionally, radiated emissions below 30MHz are also validated on an Open Area Test Site to assert correlation with the chamber measurements per the requirements of KDB 474788 D01.

3.4 Environmental Conditions

The temperature is controlled within range of 15°C to 35°C. The relative humidity is controlled within range of 10% to 75%. The atmospheric pressure is monitored within the range 86-106kPa (860-1060mbar).

FCC ID: A3LSMG986W	<u>PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage C of E4
1M1911010179-09.A3L	10/11/19 - 01/20/20	Portable Handset		Page 6 of 54
© 2020 PCTEST	•	·		V 9 0 02/01/2019



4.0 ANTENNA REQUIREMENTS

Excerpt from §15.203 of the FCC Rules/Regulations:

"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section."

- The antenna(s) of the EUT are permanently attached.
- There are no provisions for connection to an external antenna.

Conclusion:

The EUT complies with the requirement of §15.203.

FCC ID: A3LSMG986W	<u>PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga Z of 54
1M1911010179-09.A3L	10/11/19 - 01/20/20	Portable Handset		Page 7 of 54
© 2020 PCTEST		•		V 9.0 02/01/2019



5.0 MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013. All measurement uncertainty values are shown with a coverage factor of k = 2 to indicate a 95% level of confidence. The measurement uncertainty shown below meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Contribution	Expanded Uncertainty (±dB)
Conducted Bench Top Measurements	1.13
Line Conducted Disturbance	3.09
Radiated Disturbance (<1GHz)	4.98
Radiated Disturbance (>1GHz)	5.07
Radiated Disturbance (>18GHz)	5.09

FCC ID: A3LSMG986W	<u>PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dogo 9 of 54
1M1911010179-09.A3L	10/11/19 - 01/20/20	Portable Handset		Page 8 of 54
© 2020 PCTEST				V 9.0 02/01/2019



6.0 TEST EQUIPMENT CALIBRATION DATA

Test Equipment Calibration is traceable to the National Institute of Standards and Technology (NIST). Measurements antennas used during testing were calibrated in accordance to the requirements of ANSI C63.5-2017.

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
-	BT2	Bluetooth Cable Set	6/5/2019	Annual	6/5/2020	BT2
Agilent	N9020A	MXA Signal Analyzer	4/20/2019	Annual	4/20/2020	US46470561
Agilent	N4010A	Wireless Connectivity Test Set		N/A		GB46170464
Agilent	N9038A	MXE EMI Receiver	7/17/2019	Annual	7/17/2020	MY51210133
Com-Power	AL-130	9kHz - 30MHz Loop Antenna	10/10/2019	Biennial	10/10/2021	121034
Emco	3115	Horn Antenna (1-18GHz)	3/28/2018	Biennial	3/28/2020	9704-5182
EMCO	3160-09	Small Horn (18 - 26.5GHz)	8/9/2018	Biennial	8/9/2020	135427
ETS-Lindgren	3816/2NM	Line Impedance Stabilization Network	6/18/2018	Biennial	6/18/2020	114451
ETS-Lindgren	3115	Double Ridged Guide Horn 750MHz - 18GHz	3/28/2018	Biennial	3/28/2020	150693
Keysight Technologie	N9020A	MXA Signal Analyzer	4/29/2019	Annual	4/29/2020	MY54500644
Pasternack	NMLC-2	Line Conducted Emissions Cable (NM)	6/3/2019	Annual	6/3/2020	NMLC-2
Rohde & Schwarz	CMU200	Base Station Simulator		N/A		836536/0005
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	6/5/2019	Annual	6/5/2020	100342
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	7/8/2019	Annual	7/8/2020	102133
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	4/19/2018	Biennial	4/19/2020	A051107

Table 6-1. Annual Test Equipment Calibration Schedule

Notes:

1. Equipment with a calibration date of "N/A" shown in this list was not used to make direct calibrated measurements.

FCC ID: A3LSMG986W	<u> <u> <u> </u> <u> </u></u></u>	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dogo 0 of 54	
1M1911010179-09.A3L	10/11/19 - 01/20/20	Portable Handset		Page 9 of 54	
© 2020 PCTEST				V 9.0 02/01/2019	



7.0 TEST RESULTS

7.1 Summary

Company Name:	Samsung Electronics Co., Ltd.
FCC ID:	A3LSMG986W
FCC Classification:	Digital Transmission System (DTS)
Number of Channels:	<u>40</u>

FCC Part Section(s)	RSS Section(s)	Test Description	on Test Limit T Con		Test Result	Reference
15.247(a)(2)	RSS-247 [5.2]	6dB Bandwidth > 500kHz		PASS	Section 7.2	
15.247(b)(3)	RSS-247 [5.4(d)]	Transmitter Output Power	< 1 Watt		PASS	Sections 7.3
15.247(e)	RSS-247 [5.2]	Transmitter Power Spectral Density	< 8dBm / 3kHz Band	CONDUCTED	PASS	Section 7.4
15.247(d)	RSS-247 [5.5]	Band Edge / Out-of-Band Emissions	≥ 20dBc		PASS	Sections 7.5, 7.6
15.205 15.209	RSS-Gen [8.9]	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209 (RSS-Gen [8.9])	RADIATED	PASS	Sections 7.7, 7.8
15.207	RSS-Gen [8.8]	AC Conducted Emissions 150kHz – 30MHz	< FCC 15.207 limits (RSS-Gen[8.8])	LINE CONDUCTED	PASS	Section 7.9

Table 7-1. Summary of Test Results

Notes:

- 1. All modes of operation were investigated. The test results shown in the following sections represent the worst case emissions.
- 2. The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.
- 3. All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables and attenuators.
- 4. For conducted spurious emissions, automated test software was used to measure emissions and capture the corresponding plots necessary to show compliance. The measurement software utilized is PCTEST "Bluetooth LE Automation," Version 3.6.
- 5. For radiated band edge, automated test software was used to measure emissions and capture the corresponding plots necessary to show compliance. The measurement software utilized is PCTEST "Chamber Automation," Version 1.3.1.

FCC ID: A3LSMG986W	PCTEST	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 10 of 54
1M1911010179-09.A3L	10/11/19 - 01/20/20	Portable Handset		Page 10 of 54
© 2020 PCTEST		•		V 9.0 02/01/2019



7.2 6dB Bandwidth Measurement – Bluetooth (LE) §15.247(a.2); RSS-247 [5.2]

Test Overview and Limit

The bandwidth at 6dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the transmitter antenna terminal of the EUT while the EUT is operating at maximum power and at the appropriate frequencies. All modes of operation were investigated and the worst case configuration results are reported in this section.

The minimum permissible 6dB bandwidth is 500 kHz.

Test Procedure Used

ANSI C63.10-2013 – Section 11.8.2 Option 2 KDB 558074 D01 v05r02 – Section 8.2

Test Settings

- 2. The signal analyzers' automatic bandwidth measurement capability of the spectrum analyzer was used to perform the 6dB bandwidth measurement. The "X" dB bandwidth parameter was set to X = 6. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
- 3. RBW = 100kHz
- 4. VBW \ge 3 x RBW
- 5. Detector = Peak
- 6. Trace mode = max hold
- 7. Sweep = auto couple
- 8. The trace was allowed to stabilize

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.





Test Notes

None

FCC ID: A3LSMG986W	<u>PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 11 of 54	
1M1911010179-09.A3L	10/11/19 - 01/20/20	Portable Handset		Page 11 of 54	
© 2020 PCTEST		•		V 9.0 02/01/2019	



Frequency [MHz]	Data Rate	Channel No.	Bluetooth Mode	Measured Bandwidth [kHz]	Minimum Bandwidth [kHz]	Pass / Fail
2402	125 kbps	0	LE	704.2	500	Pass
2440	125 kbps	19	LE	698.6	500	Pass
2480	125 kbps	39	LE	704.3	500	Pass
2402	500 kbps	0	LE	705.3	500	Pass
2440	500 kbps	19	LE	703.3	500	Pass
2480	500 kbps	39	LE	696.2	500	Pass
2402	1 Mbps	0	LE	651.7	500	Pass
2440	1 Mbps	19	LE	654.9	500	Pass
2480	1 Mbps	39	LE	656.4	500	Pass
2402	2 Mbps	0	LE	1079.0	500	Pass
2440	2 Mbps	19	LE	1081.0	500	Pass
2480	2 Mbps	39	LE	1082.0	500	Pass

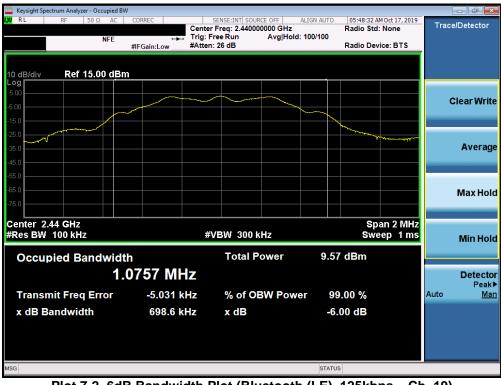
Table 7-2. Conducted Bandwidth Measurements

FCC ID: A3LSMG986W	<u>PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 12 of 54
1M1911010179-09.A3L	10/11/19 - 01/20/20	Portable Handset		Page 12 of 54
© 2020 PCTEST	-	•		V 9.0 02/01/2019



Keysight Spectrum Analy.												
🗶 RL RF	50 Ω	AC C	ORREC		Center F	NSE:INT SOUR	00000 GHz	ALIGN AUT		36 AM Oct 17, 2019 Std: None	Trac	e/Detector
	NF		IFGain:L		Trig: Fre #Atten: 2		Avg Hold	d: 100/100	Radio	Device: BTS		
	15.00	dŖm										
5.00												
-5.00		-		\frown	~~~			~			(Clear Write
15.0		\sim							\sim			
25.0	m											
-35.0												Average
-45.0												
-55.0												
-65.0												Max Hold
-75.0												
Center 2.402 GH										Span 2 MHz		
#Res BW 100 kH	Z				#VE	300 I	KHZ		\$	weep 1ms		Min Hold
Occupied B	andw	idth				Total P	ower	8.	29 dBm			
		1.0	749	MH	Z							Detecto
Transmit Fre	a Erre			763 k⊦		% of O	BW Pow		99.00 %		Auto	Peak I Mar
Transmit Free							BWFOW				Auto	IVIAI
x dB Bandwid	dth		70	4.2 k⊦	Z	x dB			6.00 dB			
ISG								STA	TUS			
		_	_									

Plot 7-1. 6dB Bandwidth Plot (Bluetooth (LE), 125kbps - Ch. 0)



Plot 7-2. 6dB Bandwidth Plot (Bluetooth (LE), 125kbps - Ch. 19)

FCC ID: A3LSMG986W	<u> PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dogo 12 of 54	
1M1911010179-09.A3L	10/11/19 - 01/20/20	Portable Handset		Page 13 of 54	
© 2020 PCTEST		·		V 9.0 02/01/2019	





Plot 7-3. 6dB Bandwidth Plot (Bluetooth (LE), 125kbps - Ch. 39)



Plot 7-4. 6dB Bandwidth Plot (Bluetooth (LE), 500kbps - Ch. 0)

FCC ID: A3LSMG986W	<u>PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 14 of 54
1M1911010179-09.A3L	10/11/19 - 01/20/20	Portable Handset		Page 14 of 54
© 2020 PCTEST		•		V 9.0 02/01/2019

2020 PCTEST









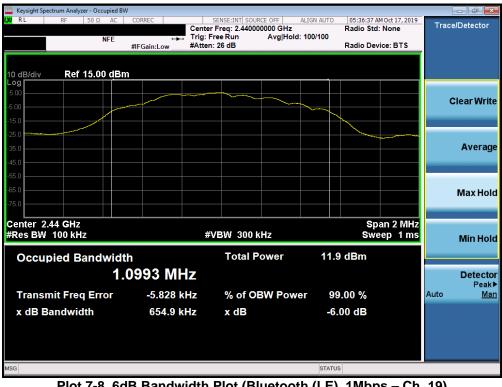
Plot 7-6. 6dB Bandwidth Plot (Bluetooth (LE), 500kbps - Ch. 39)

FCC ID: A3LSMG986W	<u> <u> <u> </u> <u> </u></u></u>	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 15 of 54
1M1911010179-09.A3L	10/11/19 - 01/20/20	Portable Handset		Page 15 of 54
© 2020 PCTEST	-	•		V 9.0 02/01/2019



🔤 Keysight Spectr															
X/RL	RF	50 Ω	AC	CORR	EC			NSE:INT SOU	OOOOO GHz	ALIGN AU			M Oct 17, 2019	Trac	e/Detector
		1	NFE				rig: Fre	e Run		ld: 100/100)				
				#IFGa	ain:Low	#	Atten: 2	26 dB			Ra	adio De	vice: BTS		
10 dB/div Log	Ref	15.00) dBr	n							<u> </u>				
5.00															
-5.00									~						Clear Write
-15.0															
-25.0															
-35.0															Average
-45.0															
-55.0															
-65.0															Max Hold
-75.0															
Center 2.4 #Res BW 1							-40.0	3W 300				Sp	an 2 MHz		
#Res BW 1	TUU KH2						#VI	SW 300	KHZ			SW	eep 1ms		Min Hold
Occupi	ied Ba	and	wid	th				Total F	Power	1	0.6 dl	Bm			
				098		ᄱ	,								Detector
				030		/11 12	4								Peak
Transmi	it Freq	Erre	or		2.14	1 kH	Z	% of O	BW Pov	ver	99.00) %		Auto	Mar
x dB Ba	ndwid	th			651.	7 kH	z	x dB			-6.00	dB			
MSG										ST	ATUS				
		_	_												

Plot 7-7. 6dB Bandwidth Plot (Bluetooth (LE), 1Mbps - Ch. 0)



Plot 7-8. 6dB Bandwidth Plot (Bluetooth (LE), 1Mbps - Ch. 19)

FCC ID: A3LSMG986W	<u> <u> <u> </u> <u> PCTEST</u> </u></u>	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		
1M1911010179-09.A3L	10/11/19 - 01/20/20	Portable Handset		Page 16 of 54
© 2020 PCTEST				V 9.0 02/01/2019









Plot 7-10. 6dB Bandwidth Plot (Bluetooth (LE), 2Mbps – Ch. 0)

FCC ID: A3LSMG986W	<u> <u> <u> </u> <u> </u></u></u>	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dogo 17 of 54
1M1911010179-09.A3L	10/11/19 - 01/20/20	Portable Handset		Page 17 of 54
© 2020 PCTEST		•		V 9.0 02/01/2019





Plot 7-11. 6dB Bandwidth Plot (Bluetooth (LE), 2Mbps – Ch. 19)



Plot 7-12. 6dB Bandwidth Plot (Bluetooth (LE), 2Mbps - Ch. 39)

FCC ID: A3LSMG986W	<u><u>PCTEST</u></u>	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 19 of 54
1M1911010179-09.A3L	10/11/19 - 01/20/20	Portable Handset		Page 18 of 54
© 2020 PCTEST				V 9.0 02/01/2019



7.3 Output Power Measurement – Bluetooth (LE) §15.247(b.3); RSS-247 [5.4(d)]

Test Overview and Limits

The transmitter antenna terminal of the EUT is connected to the input of a spectrum analyzer. Measurements are made while the EUT is operating at maximum power and at the appropriate frequencies.

The maximum permissible conducted output power is 1 Watt.

Test Procedure Used

ANSI C63.10-2013 – Section 11.9.1.1 KDB 558074 D01 v05r02 – Section 8.3.1.1

Test Settings

- 1. RBW = 3MHz
- 2. VBW = 50MHz
- 3. Span \geq 3 x RBW
- 4. Sweep = auto couple
- 5. Detector = Peak
- 6. Trace mode = max hold
- 7. The trace was allowed to stabilize

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.



Figure 7-2. Test Instrument & Measurement Setup

Test Notes

None

FCC ID: A3LSMG986W	<u> <u> <u> </u> <u> </u></u></u>	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dogo 10 of 54
1M1911010179-09.A3L	10/11/19 - 01/20/20	Portable Handset		Page 19 of 54
© 2020 PCTEST				V 9.0 02/01/2019



Frequency	Data Rate	Channel	Bluetooth	Peak Condu	cted Power	Ant. Gain	EIRP	Limit	Margin	
[MHz]	[Mbps]	No.	Mode	[dBm]	[mW]	[dBi]	LIKP		Mai giri	
2402	125 kbps	0	LE	5.66	3.681	-6.46	-0.80	36.02	-36.82	
2440	125 kbps	19	LE	6.99	5.000	-6.74	0.25	36.02	-35.77	
2480	125 kbps	39	LE	7.39	5.483	-6.86	0.53	36.02	-35.49	
2402	500 kbps	0	LE	5.73	3.741	-6.46	-0.73	36.02	-36.75	
2440	500 kbps	19	LE	6.94	4.943	-6.74	0.20	36.02	-35.82	
2480	500 kbps	39	LE	7.42	5.521	-6.86	0.56	36.02	-35.46	
2402	1 Mbps	0	LE	5.71	3.724	-6.46	-0.75	36.02	-36.77	
2440	1 Mbps	19	LE	6.98	4.989	-6.74	0.24	36.02	-35.78	
2480	1 Mbps	39	LE	7.42	5.521	-6.86	0.56	36.02	-35.46	
2402	2 Mbps	0	LE	7.36	5.445	-6.46	0.90	36.02	-35.12	
2440	2 Mbps	19	LE	8.57	7.194	-6.74	1.83	36.02	-34.19	
2480	2 Mbps	39	LE	8.66	7.345	-6.86	1.80	36.02	-34.22	

Table 7-3. Conducted Output Power Measurements ((Bluetooth (L	E))
--	---------------	-----

FCC ID: A3LSMG986W	<u> PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 20 of 54
1M1911010179-09.A3L	10/11/19 - 01/20/20	Portable Handset		Page 20 of 54
© 2020 PCTEST	-			V 9.0 02/01/2019



	ectrum Analy	zer - Swept S										- 6 -
RL	RF	50 Ω /		ORREC PNO: Fas		Trig: Fre		ALIGN AUTO	TRAC	M Oct 17, 2019 DE 1 2 3 4 5 6 DE MWWWWW T P N N N N N	F	equency
0 dB/div	Ref 15	i.00 dB		FGain:Lo	w _	Atten: 26	dB	Mkı	1 2.402	17 GHz 66 dBm		Auto Tun
5.00				******	and and the second second		↓ ¹	 ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~				Center Fre 2000000 GH
5.0											2.39	Start Fr 7000000 GI
5.0											2.40	Stop Fr 7000000 G
5.0											, <u>Auto</u>	CF St 1.000000 M M
5.0												Freq Offs 0
5.0											Log	Scale Ty
	402000 3.0 MH			#\	VBW :	50 MHz		Sweep 1	Span 1 .000 ms (0.00 MHz (1001 pts)	-	
G								STATU	5			

Plot 7-13. Peak Power Plot (Bluetooth (LE), 125kbps - Ch. 0)



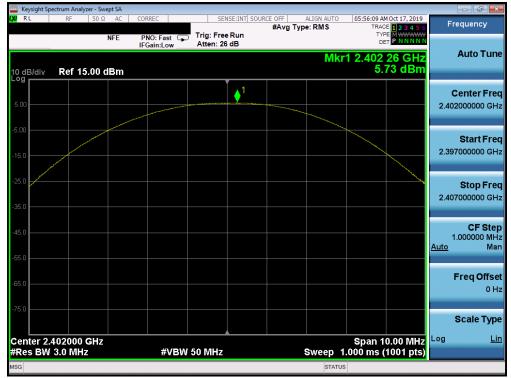
Plot 7-14. Peak Power Plot (Bluetooth (LE), 125kbps - Ch. 19)

FCC ID: A3LSMG986W	<u> <u> <u> </u> <u> PCTEST</u> </u></u>	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		
1M1911010179-09.A3L	10/11/19 - 01/20/20	Portable Handset		Page 21 of 54
© 2020 PCTEST				V 9.0 02/01/2019



	ectrum Analyze						
RL	RF	50 Ω AC	CORREC PNO: Fast	SENSE:INT SC	#Avg Type: RMS	TO 05:49:47 AM Oct 17, 2019 TRACE 1 2 3 4 5 6 TYPE M WWWWW DET P N N N N	Frequency
0 dB/div	Ref 15.	00 dBm	IFGain:Low	Atten: 26 dB	Μ	kr1 2.479 78 GHz 7.39 dBm	
5.00			and the second second second				Center Fre 2.48000000 GH
15.0							Start Fre 2.475000000 GH
25.0 35.0 							Stop Fre 2.485000000 GH
i5.0							CF Ste 1.000000 MI <u>Auto</u> M
5.0							Freq Offs 0
enter 2.	480000 G 3.0 MHz	Hz	#\/B	W 50 MHz	Swoon	Span 10.00 MHz 5 1.000 ms (1001 pts)	Scale Typ
ig	0.010112			94 547 WILL2		ATUS	

Plot 7-15. Peak Power Plot (Bluetooth (LE), 125kbps – Ch. 39)



Plot 7-16. Peak Power Plot (Bluetooth (LE), 500kbps - Ch. 0)

FCC ID: A3LSMG986W	<u>PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 22 of 54
1M1911010179-09.A3L	10/11/19 - 01/20/20	Portable Handset		Page 22 of 54
© 2020 PCTEST				V 9 0 02/01/2019



	pectrum Analyzer	- Swept SA						
X/RL	RF 5	50Ω AC	CORREC		SOURCE OFF ALIGN #Avg Type: RN	S TRACE	123456	Frequency
		NFE	PNO: Fast G	Trig: Free Run Atten: 26 dB			M WWWW P N N N N N	Auto Tur
10 dB/div Log	Ref 15.0	0 dBm				Mkr1 2.439 6.9	65 GHz 94 dBm	Auto Tune
				↓ ¹				Center Fre
5.00			and the second					2.440000000 GH
5.00								Start Fre
15.0								2.435000000 GH
-25.0								Stop Fre
35.0								2.445000000 GH
45.0								CF Ste 1.000000 MH
55.0							A	<u>luto</u> Ma
65.0								Freq Offse
								0 H
-75.0								Scale Typ
	440000 GI	Hz				Span 10		.og <u>Li</u>
FRes BW	3.0 MHz		#VBV	/ 50 MHz	Swe	ep 1.000 ms (1	001 pts)	

Plot 7-17. Peak Power Plot (Bluetooth (LE), 500kbps - Ch. 19)



Plot 7-18. Peak Power Plot (Bluetooth (LE), 500kbps - Ch. 39)

FCC ID: A3LSMG986W	<u> <u> <u> </u> <u> </u></u></u>	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		
1M1911010179-09.A3L	10/11/19 - 01/20/20	Portable Handset		Page 23 of 54
© 2020 PCTEST	•	·		V 9.0 02/01/2019



	pectrum Analyzer									
XI RL	RF	50Ω AC	CORREC	SEN	SE:INT SOURCE OFF	ALIGN AUTO		M Oct 17, 2019	F	requency
	_	NFE	PNO: Fast G	Trig: Free Atten: 26	Run		TYI Di			
10 dB/div Log	Ref 15.0	0 dBm				Mk	(r1 2.401 5.	95 GHz 71 dBm		Auto Tune
5.00			and the second designed and the se		1					Center Freq 02000000 GHz
-5.00									2.39	Start Freq 97000000 GHz
-25.0									2.40	Stop Fred
-45.0									<u>Auto</u>	CF Step 1.000000 MH Mar
-65.0										Freq Offse 0 Hi
-75.0										Scale Type
	.402000 GI / 3.0 MHz	Hz	#VBV	V 50 MHz		Sweep	Span 1 1.000 ms (0.00 MHz (1001 pts)	Log	Lin
MSG						STAT				

Plot 7-19. Peak Power Plot (Bluetooth (LE), 1Mbps - Ch. 0)



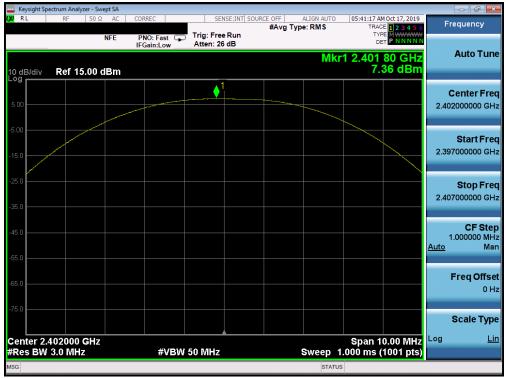
Plot 7-20. Peak Power Plot (Bluetooth (LE), 1Mbps - Ch. 19)

FCC ID: A3LSMG986W	<u> <u> <u> </u> <u> </u></u></u>	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dogo 24 of 54
1M1911010179-09.A3L	10/11/19 - 01/20/20	Portable Handset		Page 24 of 54
© 2020 PCTEST				V 9.0 02/01/2019



Keysight Spect								
X/RL	RF 50	Ω AC	CORREC	SENSE:INT SO	ALIG #Avg Type: R	MS TRA	AM Oct 17, 2019 CE 1 2 3 4 5 6	Frequency
		NFE	PNO: Fast IFGain:Low	Trig: Free Run Atten: 26 dB	•	T) E		
			in outline of			Mkr1 2.479	89 GHz	Auto Tun
0 dB/div	Ref 15.00) dBm				7.	.42 dBm	
.09				↓ ¹				Center Fre
5.00								2.480000000 GH
5.00								Start Fre
15.0	_							2.475000000 GH
25.0								Stop Fre
35.0								2.485000000 GH
.5.0								
15.0								CF Ste 1.000000 MI
								<u>Auto</u> Ma
5.0								
5.0								Freq Offs
								01
75.0								Scale Typ
enter 2.48		z	-417514			Span '		Log <u>L</u>
Res BW 3	.0 WHZ		#VBW	50 MHz	SW	eep 1.000 ms	(TOUT pts)	
G						STATUS		

Plot 7-21. Peak Power Plot (Bluetooth (LE), 1Mbps – Ch. 39)



Plot 7-22. Peak Power Plot (Bluetooth (LE), 2Mbps – Ch. 0)

FCC ID: A3LSMG986W	<u> <u> <u> </u> <u> </u></u></u>	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 25 of 54
1M1911010179-09.A3L	10/11/19 - 01/20/20	Portable Handset		Page 25 of 54
© 2020 PCTEST	•			V 9 0 02/01/2019



Bildiv Ref 15.00 dBm Center Fr 00 1 1 1 1 00 1 1 1 1 1 00 1 1 1 1 1 1 00 1			yzer - Swept SA							
Mkr1 2.439 73 GHz 8.57 dBm Center Fr 2.44000000 GHz Center Fr 2.43500000 GHz Center Fr 2.43500000 GHz Center Fr 2.4350000 GHz Center Fr 2.4400000 GHz Center Fr 2.4350000 GHz Center Fr 2.4350000 GHz Center Fr 2.4350000 GHz Center Fr 2.4350000 GHz Center Fr 2.4350000 GHz CF Ste Freq Offs 0 Center Fr 2.4350000 GHz CF Ste 1.0000 MHz Center Fr 2.4350000 GHz CF Ste 1.0000 MHz Center Fr 2.4350000 GHz CF Ste CF Ste CF Ste Center Fr 2.4350000 GHz CF Ste CF Ste Center Fr 2.4350000 GHz CF Ste CF Ste Center Fr 2.4350000 GHz CF Ste CF Ste Center Fr 2.4450000 GHz CF Ste Center Fr 2.4450000 GHz CF Ste Center Fr 2.4450000 GHz CF Ste Center Fr 2.4450000 GHz CF Ste Center Fr 2.445000 GHz CF Ste Center Fr 2.4450000 GHz CF Ste Center Fr 2.4450000 GHz CF Ste Center Fr 2.4450000 GHz CF Ste Center Fr 2.4450000 GHz CF Ste Center Fr 2.445000 GHz CF Ste Center Fr 2.4450000 GHz CF Ste Center Fr 2.4450000 GHz CF Ste Center Fr 2.445000 GHz CF Ste Center Fr 2.44500 GHz CF Ste Center Fr 2.44500 GHz CENTER FR	RL	RF				#		TRACE	23456	Frequency
Center Fr 2.44000000 G Catalog	0 dB/div	Ref 1		IFGain:Lov	Atten: 2	6 dB	MI	<r1 2.439="" 7<="" th=""><th>3 GHz</th><th>Auto Tun</th></r1>	3 GHz	Auto Tun
50 Start Fr 50 Stop Fr	5.00				1					Center Fre 2.440000000 GH
50 2.44500000 G 50 CF Ste 50 CF Ste 50 Freq Offs 50 State	15.0									Start Fre 2.435000000 GH
100 1.000000 M 100 1.000000 M 100 1.000000 M 100 1.000000 M 100 1.00000 M 100 1.000 M 100 1.00000 M <	35.0									Stop Fre 2.445000000 GH
50 Freq Offs 50 Scale Type enter 2.440000 GHz Span 10.00 MHz	5.0									CF Ste 1.000000 Mi Auto Ma
enter 2.440000 GHz Span 10.00 MHz	5.0									Freq Offs 01
Res BW 3.0 MHz #VBW 50 MHz Sweep 1.000 ms (1001 pts)								Span <u>10.(</u>	20 IVII 12	Scale Typ
3 STATUS	Res BW	3.0 MH	Z	#\	BW 50 MHz				01 pts)	

Plot 7-23. Peak Power Plot (Bluetooth (LE), 2Mbps - Ch. 19)



Plot 7-24. Peak Power Plot (Bluetooth (LE), 2Mbps - Ch. 39)

FCC ID: A3LSMG986W	<u> <u> <u> </u> <u> </u></u></u>	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dogo 20 of 54
1M1911010179-09.A3L	10/11/19 - 01/20/20	Portable Handset		Page 26 of 54
© 2020 PCTEST	<u>.</u>	·		V 9.0 02/01/2019



7.4 Power Spectral Density – Bluetooth (LE) §15.247(e); RSS-247 [5.2]

Test Overview and Limit

The peak power density is measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at maximum power and at the appropriate frequencies.

The maximum permissible power spectral density is 8 dBm in any 3 kHz band.

Test Procedure Used

ANSI C63.10-2013 – Section 11.10.2 Method PKPSD KDB 558074 D01 v05r02 – Section 8.4 DTS Maximum Power Spectral Density level in the fundamental emission

Test Settings

- 1. Analyzer was set to the center frequency of the DTS channel under investigation
- 2. Span = 1.5 times the DTS channel bandwidth
- 3. RBW = 3kHz
- 4. VBW = 1MHz
- 5. Detector = peak
- 6. Sweep time = auto couple
- 7. Trace mode = max hold
- 8. Trace was allowed to stabilize

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.



Figure 7-3. Test Instrument & Measurement Setup

Test Notes

None

FCC ID: A3LSMG986W	<u><u>PCTEST</u></u>	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 07 of 54
1M1911010179-09.A3L	10/11/19 - 01/20/20	Portable Handset		Page 27 of 54
© 2020 PCTEST				V 9.0 02/01/2019

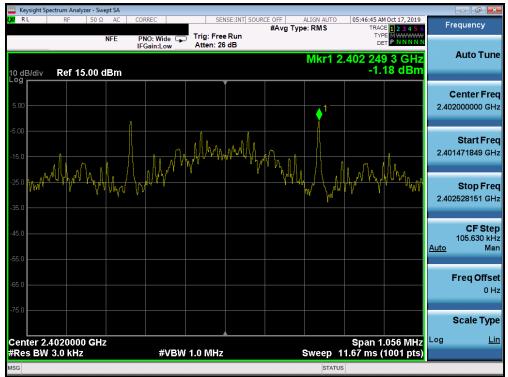


Frequency [MHz]	Data Rate [Mbps]	Channel No.	Bluetooth Mode	Measured Power Spectral Density [dBm]	Maximum Permissible Power Density [dBm / 3kHz]	Margin [dB]
2402	125 kbps	0	LE	-1.18	8.0	-9.18
2440	125 kbps	19	LE	0.15	8.0	-7.85
2480	125 kbps	39	LE	0.65	8.0	-7.35
2402	500 kbps	0	LE	-1.22	8.0	-9.22
2440	500 kbps	19	LE	-0.01	8.0	-8.01
2480	500 kbps	39	LE	0.63	8.0	-7.37
2402	1 Mbps	0	LE	-1.89	8.0	-9.89
2440	1 Mbps	19	LE	-0.66	8.0	-8.66
2480	1 Mbps	39	LE	-0.15	8.0	-8.15
2402	2 Mbps	0	LE	-4.15	8.0	-12.15
2440	2 Mbps	19	LE	-2.99	8.0	-10.99
2480	2 Mbps	39	LE	-2.83	8.0	-10.83

Table 7-4. Conducted Power Density Measurements

FCC ID: A3LSMG986W	<u>PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 20 of 54
1M1911010179-09.A3L	10/11/19 - 01/20/20	Portable Handset		Page 28 of 54
© 2020 PCTEST	-	•		V 9.0 02/01/2019





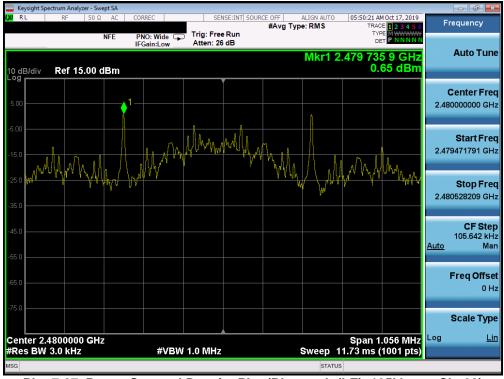
Plot 7-25. Power Spectral Density Plot (Bluetooth (LE), 125kbps – Ch. 0)



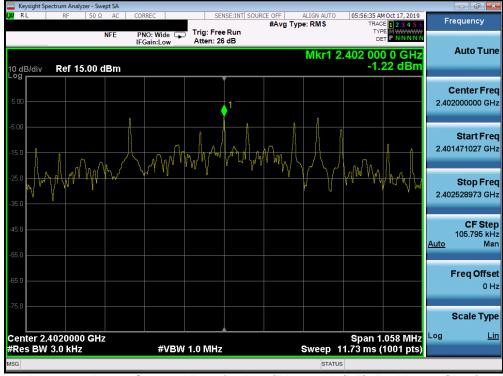
Plot 7-26. Power Spectral Density Plot (Bluetooth (LE), 125kbps – Ch. 19)

FCC ID: A3LSMG986W	<u><u>PCTEST</u></u>	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:			
1M1911010179-09.A3L	10/11/19 - 01/20/20	Portable Handset		Page 29 of 54	
© 2020 PCTEST	•	•		V 9.0 02/01/2019	





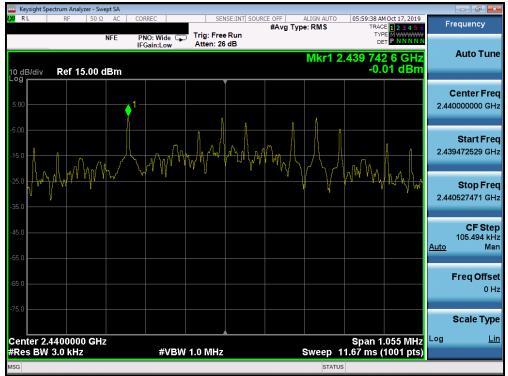




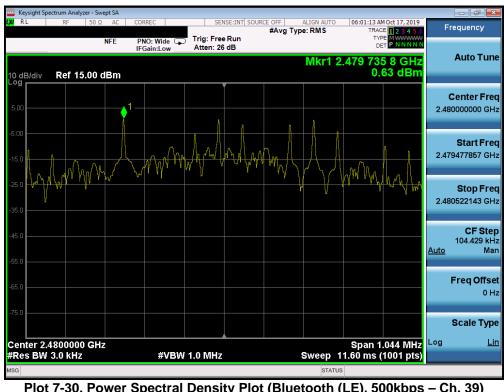
Plot 7-28. Power Spectral Density Plot (Bluetooth (LE), 500kbps - Ch. 0)

FCC ID: A3LSMG986W	PCTEST	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dogo 20 of 54
1M1911010179-09.A3L	10/11/19 - 01/20/20	Portable Handset		Page 30 of 54
© 2020 PCTEST		•		V 9.0 02/01/2019





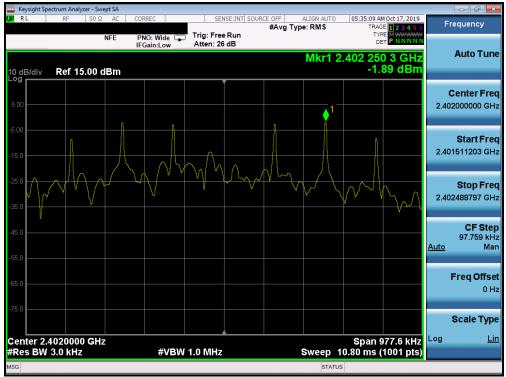
Plot 7-29. Power Spectral Density Plot (Bluetooth (LE), 500kbps - Ch. 19)



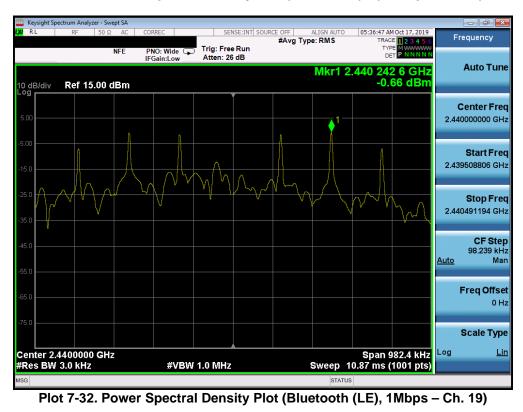
Plot 7-30. Power Spectral Density Plot (Bluetooth (LE), 500kbps - Ch. 39)

FCC ID: A3LSMG986W	<u> <u> <u> </u> <u> </u></u></u>	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dogo 21 of 54	
1M1911010179-09.A3L	10/11/19 - 01/20/20	Portable Handset	Page 31 of 54		
© 2020 PCTEST				V 9.0 02/01/2019	



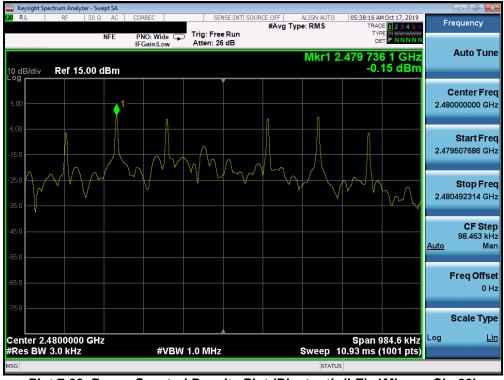


Plot 7-31. Power Spectral Density Plot (Bluetooth (LE), 1Mbps – Ch. 0)

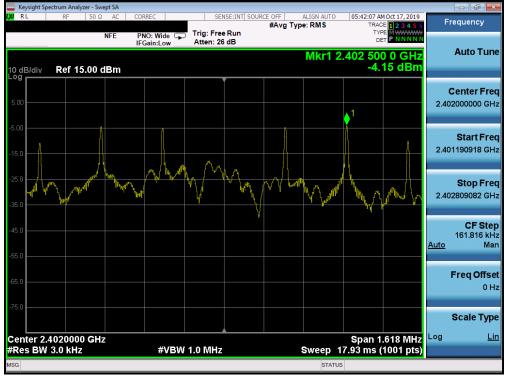


<u> PCTEST</u> Approved by: MEASUREMENT REPORT FCC ID: A3LSMG986W SAMSUNG (CERTIFICATION) Quality Manager Test Report S/N: Test Dates: EUT Type: Page 32 of 54 1M1911010179-09.A3L 10/11/19 - 01/20/20 Portable Handset © 2020 PCTEST V 9.0 02/01/2019









Plot 7-34. Power Spectral Density Plot (Bluetooth (LE), 2Mbps - Ch. 0)

FCC ID: A3LSMG986W	<u> <u> <u> </u> <u> </u></u></u>	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 22 of 54	
1M1911010179-09.A3L	10/11/19 - 01/20/20	Portable Handset	Page 33 of 54		
© 2020 PCTEST	-	·		V 9.0 02/01/2019	





Plot 7-35. Power Spectral Density Plot (Bluetooth (LE), 2Mbps – Ch. 19)



<u> PCTEST</u> Approved by: MEASUREMENT REPORT FCC ID: A3LSMG986W SAMSUNG (CERTIFICATION) Quality Manager Test Report S/N: Test Dates: EUT Type: Page 34 of 54 1M1911010179-09.A3L 10/11/19 - 01/20/20 Portable Handset © 2020 PCTEST V 9.0 02/01/2019



7.5 Conducted Emissions at the Band Edge §15.247(d); RSS-247 [5.5]

Test Overview and Limit

For the following out of band conducted spurious emissions plots at the band edge, the EUT was set to transmit at maximum power with the largest packet size available. These settings produced the worst-case emissions.

The limit for out-of-band spurious emissions at the band edge is 20dB below the fundamental emission level, as determined from the in-band power measurement of the DTS channel performed in a 100kHz bandwidth.

Test Procedure Used

ANSI C63.10-2013 – Section 11.11.3 KDB 558074 D01 v05r02 – Section 8.7.2

Test Settings

- 1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
- 2. Span was set large enough so as to capture all out of band emissions near the band edge
- 3. RBW = 100kHz
- 4. VBW = 300kHz
- 5. Detector = Peak
- 6. Number of sweep points ≥ 2 x Span/RBW
- 7. Trace mode = max hold
- 8. Sweep time = auto couple
- 9. The trace was allowed to stabilize

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.



Figure 7-4. Test Instrument & Measurement Setup

Test Notes

None

FCC ID: A3LSMG986W	<u><u>PCTEST</u></u>	T MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 25 of 54	
1M1911010179-09.A3L	10/11/19 - 01/20/20	Portable Handset	Page 35 of 54		
© 2020 PCTEST				V 9.0 02/01/2019	



Keysight Spectrum Ar	nalyzer - Swept SA								
X/RL RF	50 Ω AC	CORREC	SENSE:INT SC	Avg Type	ALIGN AUTO	TRAC	Oct 17, 2019	F	requency
	NFE	PNO: Wide IFGain:Low	Trig: Free Run Atten: 26 dB			TYP DE	E M WWWWW P N N N N N		
		II Guill.LOW			ΔΝ	lkr1 2.9	36 MHz		Auto Tun
10 dB/div Ref	15.00 dBm					51	1.80 dB		
			Ĭ						Center Fre
5.00					1∆2				00000000 GH
					\sim				
5.00					/ \				Start Fre
15.0				ſ		.]		2.39	96000000 GH
25.0									Stop Fre
35.0				wet		*}		2.40	04000000 GH
				A		Ň	h		
45.0				کم			ma		CF Ste 800.000 kH
55.0 WMMMMM	and the Andreast		a and marco march				haven	<u>Auto</u>	Ma
55.0	NAMANS, AN A LONG L. (UR A.	And - I B. Malann C	A Carl of the carl				`		
65.0									Freq Offs
									0 F
75.0									
									Scale Typ
enter 2.40000				1		Span 8.	000 MHz	Log	L
Res BW 100 k	Hz	#VBW	300 kHz			.067 ms (:	2001 pts)		
SG					STATUS				

Plot 7-37. Band Edge Plot (Bluetooth (LE), 125kbps - Ch. 0)



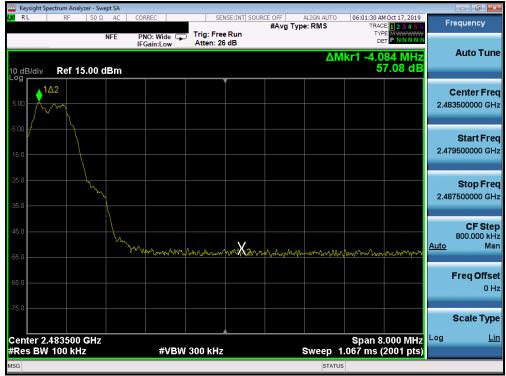
Plot 7-38. Band Edge Plot (Bluetooth (LE), 125kbps – Ch. 39)

FCC ID: A3LSMG986W	<u> <u> <u> </u> <u> </u></u></u>	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 26 of 54	
1M1911010179-09.A3L	10/11/19 - 01/20/20	Portable Handset	Page 36 of 54		
© 2020 PCTEST	•			V 9 0 02/01/2019	



Keysight Spectrum											
XIRL R	F 50 Ω	AC CO	RREC		ISE:INT SOUR	CE OFF #Avg Typ	ALIGN AUTO e: RMS	TRAC	HOct 17, 2019	F	requency
	١	NFE PI	NO: Wide 🕞 Gain:Low	Trig: Free Atten: 26							
	f 15.00 d	Bm					ΔN	1kr1 2.6 5	12 MHz 4.34 dB		Auto Tun
- og 5.00							1∆2				Center Fre
5.00							\bigwedge				
-5.00						4				2.39	Start Fre
15.0								1 N			
-25.0						~		- Jong		2.40	Stop Fre 04000000 GH
35.0						pl.					05.044
45.0 55.0 ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	antes in the out of	m. n. AMr	ARD works a	2 dealer	mover and the				Land	<u>Auto</u>	CF Ste 800.000 kH Ma
55.0	n hunderif eine och	CONTINUE OF DE	to office a cha	U OUR ON CONTEN							
65.0											Freq Offs 0 H
75.0											Scale Typ
Center 2.4000								Snan 9	.000 MHz	Log	L
Res BW 100			#VBW	/ 300 kHz			Sweep 1	.067 ms (2001 MH2 2001 pts)		
SG							STATUS				

Plot 7-39. Band Edge Plot (Bluetooth (LE), 500kbps - Ch. 0)



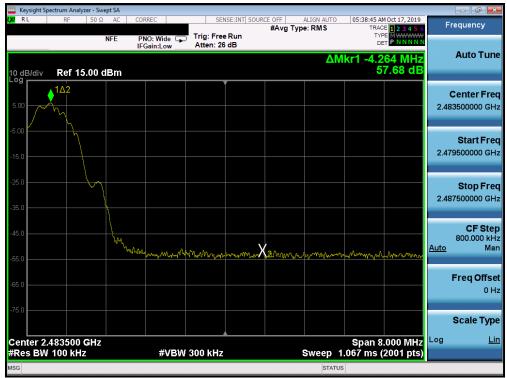
Plot 7-40. Band Edge Plot (Bluetooth (LE), 500kbps - Ch. 39)

FCC ID: A3LSMG986W	<u> <u> <u> </u> <u> </u></u></u>	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dege 27 of 54
1M1911010179-09.A3L	10/11/19 - 01/20/20	Portable Handset		Page 37 of 54
© 2020 PCTEST		·		V 9.0 02/01/2019



	ectrum Analy.												
XU RL	RF	50 Ω	AC (ORREC			NSE:INT SOU	#Avg Typ	ALIGN AUTO e: RMS	TRAC	M Oct 17, 2019	F	requency
		N		PNO: Wi IFGain:Lo		Trig: Free Atten: 20			Δ				Auto Tun
10 dB/div _og	Ref 15	.00 dE	3m							5	6.02 dB		
5.00									<u>1∆2</u>				Center Fre
5.00								ļ,	/ ^	1			01
15.0										$\left[\right]$		2.3	Start Fre 96000000 GH
25.0													
								\int		\sim		2.4	Stop Fre 04000000 GH
35.0							nd	d and the second se		۲ ا			CF Ste
45.0 55.0 Mm	MARYNAM	<u>∧</u> ~~~m	war	man	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~Xi2,~	w.www.				mynama	<u>Auto</u>	800.000 kł Ma
5.0													Freq Offs
													01
75.0													Scale Typ
	400000 100 kHz			#	VBW	300 kHz			Sweep 1	Span 8 .067 ms (.000 MHz (2001 pts)	Log	Ŀ
SG									STATUS				

Plot 7-41. Band Edge Plot (Bluetooth (LE), 1Mbps - Ch. 0)



Plot 7-42. Band Edge Plot (Bluetooth (LE), 1Mbps - Ch. 39)

FCC ID: A3LSMG986W	<u> <u> <u> </u> <u> </u></u></u>	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 20 of E4
1M1911010179-09.A3L	10/11/19 - 01/20/20	Portable Handset		Page 38 of 54
© 2020 PCTEST	-	•		V 9.0 02/01/2019



Keysight Sp	ectrum Analy	/zer - Swep	t SA										
RL	RF	50 Ω	AC	CORREC		SE	NSE:INT SOU	RCE OFF	ALIGN AUTO		M Oct 17, 2019 CE 1 2 3 4 5 6	F	requency
		N	FE	PNO: W IFGain:I	lide ⊊ ∟ow	Trig: Fre Atten: 20		"g.)	•	۲۷۱ DI Mkr1 2.0			Auto Tur
) dB/div	Ref 1	5.00 de	3m							4	5.59 dB		
5.00										2			Center Fre
5.0								$\int dr $		Y M		2.39	Start Fre
5.0												2.40	Stop Fr 04000000 G
5.0	50 0ÅØ			*	مهرهما آلو	Ma Pa d	<₂∕∕				- Var	<u>Auto</u>	CF St e 800.000 k M
5.0	maga Man	עזאב איי	ψ γ ι _γ αίο _σ		~~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~	. 1¥ W.							Freq Offs 0
5.0												Log	Scale Ty
	400000 100 kH				#VBW	300 kHz			Sweep	Span 8 1.067 m <u>s (</u>	.000 MHz 2001 pts)	LUg	L
G									STATU				

Plot 7-43. Band Edge Plot (Bluetooth (LE), 2Mbps - Ch. 0)



Plot 7-44. Band Edge Plot (Bluetooth (LE), 2Mbps - Ch. 39)

FCC ID: A3LSMG986W	<u> <u> <u> </u> <u> </u></u></u>	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 20 of 54
1M1911010179-09.A3L	10/11/19 - 01/20/20	Portable Handset		Page 39 of 54
© 2020 PCTEST				V 9.0 02/01/2019



7.6 Conducted Spurious Emissions §15.247(d); RSS-247 [5.5]

Test Overview and Limit

For the following out of band conducted spurious emissions plots, the EUT was set to transmit at maximum power with the largest packet size available. The worst case spurious emissions were found in this configuration.

The limit for out-of-band spurious emissions at the band edge is 20dB below the fundamental emission level, as determined from the in-band power measurement of the DTS channel performed in a 100kHz bandwidth per the procedure in Section 8.5 of KDB 558074 D01 v05r02 and Section 11.11.3 of ANSI C63.10-2013.

Test Procedure Used

ANSI C63.10-2013 – Section 11.11.3 KDB 558074 D01 v05r02 – Section 8.5

Test Settings

- 1. Start frequency was set to 30MHz and stop frequency was set to 25GHz (separated into two plots per channel)
- 2. RBW = 1MHz
- 3. VBW = 3MHz
- 4. Detector = Peak
- 5. Trace mode = max hold
- 6. Sweep time = auto couple
- 7. The trace was allowed to stabilize

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.



Figure 7-5. Test Instrument & Measurement Setup

FCC ID: A3LSMG986W	<u>CPCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dogo 40 of 54
1M1911010179-09.A3L	10/11/19 - 01/20/20	Portable Handset		Page 40 of 54
© 2020 PCTEST				V 9 0 02/01/2019



Test Notes

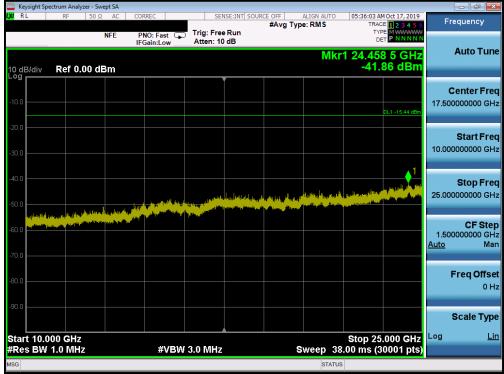
- 1. RBW was set to 1MHz rather than 100kHz in order to increase the measurement speed.
- 2. The display line shown in the following plots denotes the limit at 20dB below the fundamental emission level measured in a 100kHz bandwidth. However, since the traces in the following plots are measured with a 1MHz RBW, the display line may not necessarily appear to be 20dB below the level of the fundamental in a 1MHz bandwidth.
- 3. For plots showing conducted spurious emissions near the limit, the frequencies were investigated with a reduced RBW to ensure that no emissions were present.

FCC ID: A3LSMG986W	PCTEST	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 41 of 54
1M1911010179-09.A3L	10/11/19 - 01/20/20	Portable Handset		Page 41 of 54
© 2020 PCTEST				V 9.0 02/01/2019



	ctrum Analyzer - Sw											- 0
K RL	RF 50 Ω	NFE		NO: Fast	Trig: Free		#Avg Typ	ALIGN AUTO e: RMS	TRAC	M Oct 17, 2019 E 1 2 3 4 5 6 E M WWWW	Free	quency
I0 dB/div	Ref 15.00		IFO	Gain:Low	Atten: 26	dB		Mk	(r1 9.40)	3 8 GHz 70 dBm	ļ	Auto Tun
5.00												enter Fre
15.0										<u>DL1 -15.44 dBm</u>		Start Fre
35.0										1		Stop Fre
45.0 1-10-110-110 55.0	The providence of the second s	n litere	ng de daraj je koni jena od	n a la bhaigeach Mhaile ann an Albaile an Na ha chuire ann an Albaile ann Ann an Albaile ann an Albaile Ann an Albaile ann an Albaile ann an Albaile Ann an Albaile ann an Albaile ann an Albaile Ann an Albaile ann an			ngan di Ingelangkan pelantan di Ingelangkan pelantan di Ingelangkan pelantan di Ingelangkan pelantan di Ingelan Pelantan pelantan pelantan Pelantan pelantan		, allering and age of the second		997.0 <u>Auto</u>	CF Ste 000000 MH Ma
65.0											FI	r eq Offs 0 I
75.0 Start 30 M									Stop 10	.000 GHz 0001 pts)	S Log	cale Typ
Res BW	1.0 MHz			#VBW	/ 3.0 MHz		S	weep 18		0001 pts)		

Plot 7-45. Conducted Spurious Plot (Bluetooth (LE), 1Mbps - Ch. 0)



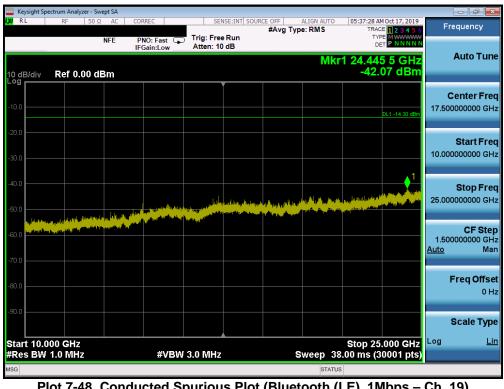
Plot 7-46. Conducted Spurious Plot (Bluetooth (LE), 1Mbps – Ch. 0)

FCC ID: A3LSMG986W	<u> PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 42 of 54
1M1911010179-09.A3L	10/11/19 - 01/20/20	Portable Handset		Page 42 of 54
© 2020 PCTEST				V 9.0 02/01/2019



	pectrum Anal												
RL	RF	50 Ω	AC	CORREC		SEI	NSE:INT SO		ALIGN AUT ype: RMS		:09 AM Oct 17, 2019 TRACE 1 2 3 4 5 6	Fr	equency
		NF		PNO: Fast		rig: Free			,,				
				IFGain:Low	<u> </u>	tten: 26	6 dB						Auto Tun
										Mkr1 6.	797 6 GHz		Auto Tun
0 dB/div	Ref 1	5.00 dB	lm							-	38.06 dBm		
° ^g						,	Í						
5.00													Center Fre
5.00												5.01	5000000 GH
5.00													Start Fre
											DL1 -14.30 dBm	30	000000 MH
15.0												50	
25.0													Stop Fre
									4			10.00	0000000 GH
35.0)'				
				e a dahat alam	ь II .	, and the second second	والتألي ومعدر	and problems	hills and a group of	or humbly bar	and a strange of the party of		05.04+
45.0		Children and a second	ير بر م مركز المريد	Jackson and	and support	ALC: NO.		فلتعط بالبريافاليس ماني	Allow a station of the	يعمر خلقور حققي	an dina sa dina pangkan di kana di kana di	997	CF Ste 000000 MF
and a state		a district of the			and a stand	N						Auto	Ma
55.0													
65.0													Freq Offs
													0 H
75.0													
													Scale Typ
tart 30										Stop	10.000 GHz	Log	L
Res BM	/ 1.0 MH	z		#V	BW 3.0	JMHz			Sweep	18.00 m	s (30001 pts)		
G									ST	ATUS			

Plot 7-47. Conducted Spurious Plot (Bluetooth (LE), 1Mbps - Ch. 19)



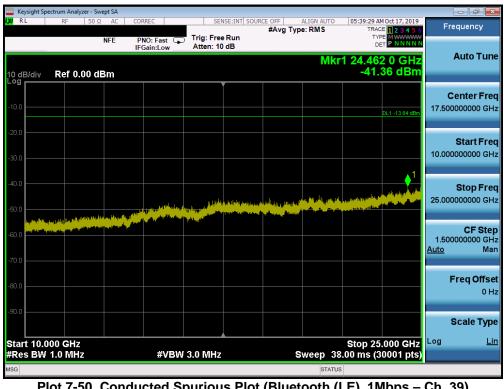
Plot 7-48. Conducted Spurious Plot (Bluetooth (LE), 1Mbps – Ch. 19)

FCC ID: A3LSMG986W	PCTEST	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 42 of 54
1M1911010179-09.A3L	10/11/19 - 01/20/20	Portable Handset		Page 43 of 54
© 2020 PCTEST				V 9.0 02/01/2019



	pectrum Analyz											J X
X/RL	RF	50 Ω AC				NSE:INT SOU	RCE OFF #Avg Typ	ALIGN AUTO	TRA	M Oct 17, 2019	Frequen	су
		NFE	PNO IFGai	:Fast 🖵 n:Low	Atten: 26						Auto	Tune
10 dB/div	Ref 15	.00 dBm	1					M	kr1 9.69 -37.	0 9 GHz 06 dBm	Auto	Tan
											Center	
5.00											5.01500000	00 GH
5.00											Start	
15.0										DL1 -13.84 dBm	30.00000	0 MH
25.0											Stop	
35.0										∮1	10.0000000	00 GH
45.0	and the second s	Hand and a local d	angela k	and and a Magnet	burnetter prototot fils		terrarian and a second seco	ante (parte (p) et antes préses pr	n palén pinan di Seconder di Second			Ste
55.0	- Statement of the	and a time tool dalk			i Sa, dini ng Kalangali di						997.00000 <u>Auto</u>	io M⊢ Ma
											Freq	Offso
65.0												0 H
75.0											Scale	Тур
Start 30 I				#\/D\//	3.0 MHz				Stop 10	.000 GHz 30001 pts)	Log	Li
	1.0 MHz			#VBW	3.0 MHZ			STATU		iooon pisj		

Plot 7-49. Conducted Spurious Plot (Bluetooth (LE), 1Mbps - Ch. 39)



Plot 7-50. Conducted Spurious Plot (Bluetooth (LE), 1Mbps - Ch. 39)

FCC ID: A3LSMG986W	<u><u>PCTEST</u></u>	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 44 of 54
1M1911010179-09.A3L 10/11/19 - 01/20/20 Portable		Portable Handset		Page 44 of 54
© 2020 PCTEST				V 9.0 02/01/2019



7.7 Radiated Spurious Emission Measurements §15.205 §15.209 §15.247(d); RSS-Gen [8.9]

Test Overview and Limit

All out of band radiated spurious emissions are measured with a spectrum analyzer connected to a receive antenna while the EUT is operating at maximum power and at the appropriate frequencies. Only the radiated emissions of the configuration that produced the worst case emissions are reported in this section.

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR and Table 6 of RSS-Gen (8.10) must not exceed the limits shown in Table 7-5 per Section 15.209 and RSS-Gen (8.9).

Frequency	Field Strength [μV/m]	Measured Distance [Meters]
0.009 – 0.490 MHz	2400/F (kHz)	300
0.490 – 1.705 MHz	24000/F (kHz)	30
1.705 – 30.00 MHz	30	30
30.00 – 88.00 MHz	100	3
88.00 – 216.0 MHz	150	3
216.0 – 960.0 MHz	200	3
Above 960.0 MHz	500	3

Table 7-5. Radiated Limits

Test Procedures Used

ANSI C63.10-2013 – Section 6.6.4.3

KDB 558074 D01 v05r02 - Section 8.6, 8.7

Test Settings

Average Field Strength Measurements

- 1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
- 2. RBW = 1MHz
- 3. VBW = 3kHz > 1/T
- 4. Averaging type was set to RMS to ensure that video filtering was applied in the power domain
- 5. Detector = peak
- 6. Sweep time = auto
- 7. Trace mode = max hold
- 8. Trace was allowed to run for at least 50 times (1/duty cycle) traces

FCC ID: A3LSMG986W	PCTEST	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dogo 45 of 54	
1M1911010179-09.A3L	10/11/19 - 01/20/20	Portable Handset		Page 45 of 54	
© 2020 PCTEST				V 9 0 02/01/2019	



Peak Field Strength Measurements

- 1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
- 2. RBW is set depending on measurement frequency, as specified in Table 7-6 below
- 3. VBW = 3MHz
- 4. Detector = peak
- 5. Sweep time = auto couple
- 6. Trace mode = max hold
- 7. Trace was allowed to stabilize

Frequency	RBW
9 – 150kHz	200 – 300Hz
0.15 – 30MHz	9 – 10kHz
30 – 1000MHz	100 – 120kHz
> 1000MHz	1MHz

Table 7-6. RBW as a Function of Frequency

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

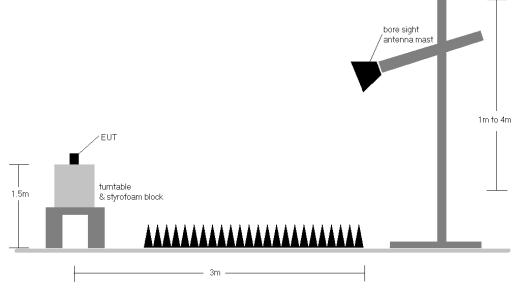


Figure 7-6. Radiated Test Setup >1GHz

FCC ID: A3LSMG986W	<u>PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type: Portable Handset		Dogo 4C of 54
1M1911010179-09.A3L	10/11/19 - 01/20/20			Page 46 of 54
© 2020 PCTEST	•	•		V 9.0 02/01/2019



Test Notes

- The optional test procedures for antenna port conducted measurements of unwanted emissions per the guidance of KDB 558074 D01 v05r02 were not used to evaluate this device for compliance to radiated limits. All radiated spurious emissions levels were measured in a radiated test setup.
- 2. All emissions lying in restricted bands specified in §15.205 and Section 8.10 of RSS-Gen are below the limit shown in Table 7-5.
- 3. The antenna is manipulated through typical positions, polarity and length during the tests. The EUT is manipulated through three orthogonal planes.
- 4. This unit was tested with its standard battery.
- 5. The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter using CISPR quasi peak detector below 1GHz. Above 1 GHz, average and peak measurements were taken using linearly polarized horn antennas. The worst-case emissions are reported however emissions whose levels were not within 20dB of the respective limits were not reported.
- Average measurements were recorded using a VBW of 3kHz, per Section 4.1.4.2.3 of ANSI C63.10-2013, since 1/T is equal to just under 3kHz. This method was used because the EUT could not be configured to operate with a duty cycle > 98%. Both average and peak measurements were made using a peak detector
- 7. Emissions below 18GHz were measured at a 3 meter test distance while emissions above 18GHz were measured at a 1 meter test distance with the application of a distance correction factor.
- 8. No significant radiated band edge emissions were found in the 2310 2390MHz restricted band.
- 9. The "-" shown in the following RSE tables are used to denote a noise floor measurement.

Sample Calculations

Determining Spurious Emissions Levels

- Field Strength Level [dBµV/m] = Analyzer Level [dBm] + 107 + AFCL [dB/m]
- AFCL [dB/m] = Antenna Factor [dB/m] + Cable Loss [dB]
- $\circ \quad \text{Margin}_{[dB]} = \text{Field Strength Level}_{[dB\mu V/m]} \text{Limit}_{[dB\mu V/m]}$

Radiated Band Edge Measurement Offset

• The amplitude offset shown in the radiated restricted band edge plots in Section 7.8 was calculated using the formula:

Offset (dB) = (Antenna Factor + Cable Loss + Attenuator) – Preamplifier Gain

FCC ID: A3LSMG986W	<u> PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager			
Test Report S/N: Test Dates:		EUT Type:		Dage 47 of 54			
1M1911010179-09.A3L 10/11/19 - 01/20/20		Portable Handset		Page 47 of 54			
© 2020 PCTEST V 9.0 02/01/2019							



Radiated Spurious Emission Measurements §15.205 §15.209 §15.247(d); RSS-Gen [8.9]

Bluetooth Mode:	LE
Distance of Measurements:	3 Meters
Operating Frequency:	2402MHz
Channel:	0

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
4804.00	Avg	V	-	-	-80.81	7.11	33.30	53.98	-20.68
4804.00	Peak	V	-	-	-67.29	7.11	46.82	73.98	-27.16
12010.00	Avg	V	-	-	-82.91	18.06	42.15	53.98	-11.83
12010.00	Peak	V	-	-	-71.30	18.06	53.76	73.98	-20.22

Table 7-7. Radiated Measurements @ 3 meters

Bluetooth Mode: Distance of Measurements: **Operating Frequency:** Channel:

LE 3 Meters 2440MHz 19

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
4880.00	Avg	V	-	-	-81.55	7.77	33.22	53.98	-20.76
4880.00	Peak	V	-	-	-68.47	7.77	46.30	73.98	-27.68
7320.00	Avg	V	-	-	-82.25	12.12	36.87	53.98	-17.11
7320.00	Peak	V	-	-	-69.98	12.12	49.14	73.98	-24.84
12200.00	Avg	V	-	-	-83.66	19.01	42.35	53.98	-11.63
12200.00	Peak	V	-	-	-71.39	19.01	54.62	73.98	-19.36

Table 7-8. Radiated Measurements @ 3 meters

FCC ID: A3LSMG986W	<u> PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager	
Test Report S/N:	Test Dates:	EUT Type:		Dage 40 of 54	
1M1911010179-09.A3L 10/11/19 - 01/20/20		Portable Handset		Page 48 of 54	
© 2020 PCTEST				V 9.0 02/01/2019	

2020 PCTEST



Radiated Spurious Emission Measurements §15.205 §15.209 §15.247(d); RSS-Gen [8.9]

Bluetooth Mode:	LE
Distance of Measurements:	3 Meters
Operating Frequency:	2480MHz
Channel:	39

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
4960.00	Avg	V	-	-	-81.31	7.08	32.77	53.98	-21.21
4960.00	Peak	V	-	-	-69.22	7.08	44.86	73.98	-29.12
7440.00	Avg	V	-	-	-82.45	12.11	36.66	53.98	-17.32
7440.00	Peak	V	-	-	-69.44	12.11	49.67	73.98	-24.31
12400.00	Avg	V	-	-	-84.12	18.62	41.50	53.98	-12.48
12400.00	Peak	V	-	-	-71.66	18.62	53.96	73.98	-20.02

Table 7-9. Radiated Measurements @ 3 meters

FCC ID: A3LSMG986W	<u><u>PCTEST</u></u>	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 40 of 54
1M1911010179-09.A3L	10/11/19 - 01/20/20	Portable Handset		Page 49 of 54
© 2020 PCTEST	-	·		V 9.0 02/01/2019

All rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.



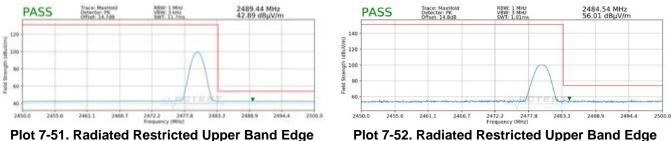
7.8 Radiated Restricted Band Edge Measurements §15.209; RSS-Gen [8.9]

The radiated restricted band edge measurements are measured with an EMI test receiver connected to the receive antenna while the EUT is transmitting.

The amplitude offset shown in the following plots for average measurements was calculated using the formula:

Offset (dB) = (Antenna Factor + Cable Loss + Attenuator) – Preamplifier Gain

Bluetooth Mode:	LE
Measurement Distance:	3 Meters
Operating Frequency:	2480MHz
Channel:	39



Neasurement (Average)



FCC ID: A3LSMG986W	PCTEST	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 50 of 54
1M1911010179-09.A3L	10/11/19 - 01/20/20	Portable Handset		Page 50 of 54
© 2020 PCTEST				V 9 0 02/01/2019



7.9 Line-Conducted Test Data §15.207; RSS-Gen [8.8]

Test Overview and Limit

All AC line conducted spurious emissions are measured with a receiver connected to a grounded LISN while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates and modes were investigated for conducted spurious emissions. Only the conducted emissions of the configuration that produced the worst case emissions are reported in this section.

All conducted emissions must not exceed the limits shown in the table below, per Section 15.207 and RSS-Gen (8.8).

Frequency of emission (MHz)	Conducted Limit (dBµV)		
	Quasi-peak	Average	
0.15 – 0.5	66 to 56*	56 to 46*	
0.5 - 5	56	46	
5 - 30	60	50	

Table 7-10. Conducted Limits

*Decreases with the logarithm of the frequency.

Test Procedures Used

ANSI C63.10-2013, Section 6.2

Test Settings

Quasi-Peak Field Strength Measurements

- 1. Analyzer center frequency was set to the frequency of the spurious emission of interest
- 2. RBW = 9kHz (for emissions from 150kHz 30MHz)
- 3. Detector = quasi-peak
- 4. Sweep time = auto couple
- 5. Trace mode = max hold
- 6. Trace was allowed to stabilize

Average Field Strength Measurements

- 1. Analyzer center frequency was set to the frequency of the spurious emission of interest
- 2. RBW = 9kHz (for emissions from 150kHz 30MHz)
- 3. Detector = RMS
- 4. Sweep time = auto couple
- 5. Trace mode = max hold
- 6. Trace was allowed to stabilize

FCC ID: A3LSMG986W	<u> <u> <u> </u> <u> </u></u></u>	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dogo E1 of E4
1M1911010179-09.A3L	10/11/19 - 01/20/20	Portable Handset		Page 51 of 54
© 2020 PCTEST				V 9 0 02/01/2019



Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

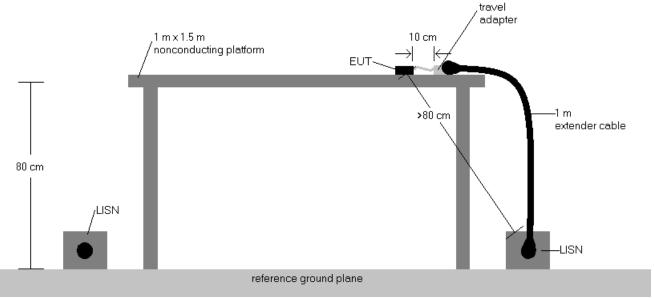


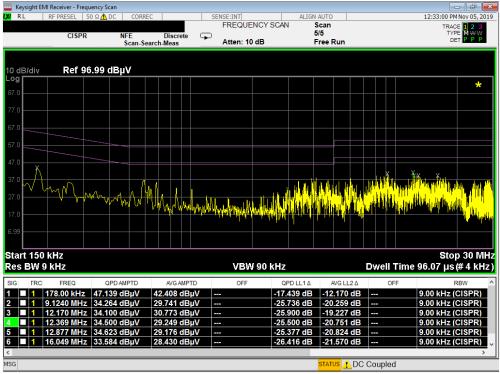
Figure 7-7. Test Instrument & Measurement Setup

Test Notes

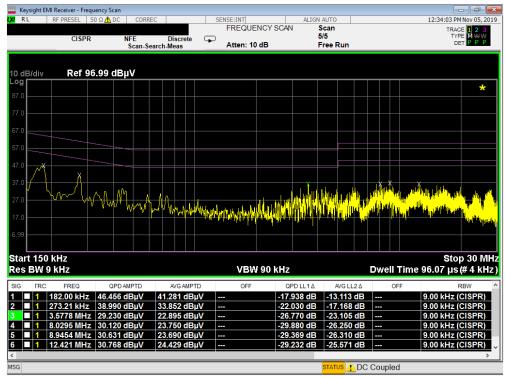
- All modes of operation were investigated and the worst-case emissions are reported using mid channel. The emissions found were not affected by the choice of channel used during testing.
- 2. The limit for an intentional radiator from 150kHz to 30MHz are specified in Part 15.207 and RSS-Gen (8.8).
- 3. Corr. (dB) = Cable loss (dB) + LISN insertion factor (dB)
- 4. QP/AV Level (dB μ V) = QP/AV Analyzer/Receiver Level (dB μ V) + Corr. (dB)
- 5. Margin (dB) = QP/AV Limit (dB μ V) QP/AV Level (dB μ V)
- 6. Traces shown in plot are made using a peak detector.
- 7. Deviations to the Specifications: None.

FCC ID: A3LSMG986W	<u> <u> <u> </u> <u> </u></u></u>	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 50 of 54
1M1911010179-09.A3L	10/11/19 - 01/20/20	Portable Handset		Page 52 of 54
© 2020 PCTEST	*	*		V 9.0 02/01/2019









Plot 7-54. Line Conducted Plot with Bluetooth LE (N)

FCC ID: A3LSMG986W	<u> PCTEST</u>	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Daga 52 of 54
1M1911010179-09.A3L	10/11/19 - 01/20/20	Portable Handset		Page 53 of 54
© 2020 PCTEST		•		V 9 0 02/01/2019



8.0 CONCLUSION

The data collected relate only the item(s) tested and show that the **Samsung Portable Handset FCC ID: A3LSMG986W** is in compliance with Part 15 Subpart C (15.247) of the FCC Rules and RSS-247 of the Innovation, Science and Economic Development Canada Rules.

FCC ID: A3LSMG986W	<u> <u> <u> </u> <u> </u></u></u>	MEASUREMENT REPORT (CERTIFICATION)	SAMSUNG	Approved by: Quality Manager
Test Report S/N:	Test Dates:	EUT Type:		Dage 54 of 54
1M1911010179-09.A3L	10/11/19 - 01/20/20	Portable Handset		Page 54 of 54
© 2020 PCTEST		•		V 9.0 02/01/2019